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Research Brief

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EFFECTIVE PRE-SCHOOL, PRIMARY AND SECONDARY EDUCATION PROJECT (EPPSE 3-14)

Influences on students' attainment and progress in Key Stage 3: Academic outcomes in English, maths and science in Year 9

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Introduction

The Effective Pre-school, Primary and Secondary Education Project (EPPSE) has investigated the academic and social-behavioural development of approximately 3,000 children from the age of 3+ years since 1997. This Research Brief focuses on the relationships between a range of individual student, family, home, pre-, primary and secondary school characteristics and students' academic attainment in English, maths and science in Year 9 at secondary school (age 14). It compares the latest findings with those found for students' attainment at younger ages. It also highlights the influences of secondary school on students' attainment in the core curriculum areas and studies their academic progress across Key Stage 3 between the ages of 11 and 14.

Key Findings

Individual student, family and home influences

1) Differences in attainment related to background influences which emerged early (at age 3) have remained fairly stable through to the end of Key Stage 3 (KS3; age 14). Both mothers' and fathers' (to a lesser extent) educational level strongly predicted attainment as measured by Teacher Assessment levels (TA) in Year 9 and also progress across KS3.

2) Girls had significantly better attainment in English than boys and also made more progress in English, maths and science over KS3.

3) Older students (autumn-born compared with summer-born) in a year group showed higher attainment and appeared to increase their advantage by making more progress over KS3.

4) Other moderately strong predictors of attainment in all core subjects included the early years home learning environment (HLE), birth weight, family income and free school meal (FSM) status. For English only, a lower family income and FSM status also predicted poorer progress across KS3.

5) Students who lived in disadvantaged neighbourhoods had poorer attainment, over and above child and family characteristics, although these neighbourhood effects are relatively small compared to those of the individual student and family measures.

Pre-school influences

6) Both pre-school quality and pre-school effectiveness continued to predict students' later academic attainment in Year 9, even after controlling for background characteristics.

7) The early experience of high quality pre-school predicted better outcomes for maths and science at age 14, but not for English. Pre-school effectiveness[1] had a continuing effect on English (for pre-schools effective in promoting pre-reading skills), maths and science (for pre-schools effective in promoting early number concepts). However, these effects were weaker than at younger ages.

8) The continued benefits of pre-school were most evident for students who went on to attend secondary schools of medium or low academic effectiveness (based on the DfE[2] contextual value added indicator). This is in line with earlier results which showed that pre-school had a similar 'protective' effect on attainment at the end of Key Stage 2.

Primary school influences

9) Having attended a more academically effective[3] primary school continued to predict significantly better academic attainment for EPPSE students in maths and science, but not English at the end of KS3.

10) Students who had experienced a positive transition from primary school (in terms of gaining familiarity with new routines and continuity in the curriculum) were more likely to have higher attainment in all core subjects and also to make better progress in maths and science at age 14 (controlling for background factors, although the effects were relatively small).

Secondary school influences

11) Two Ofsted measures of the secondary school's quality (inspectors' judgments of 'quality of pupils' learning' and 'learners' attendance') predicted better attainment and progress for the EPPSE sample. Students who attended an 'outstanding' secondary school had better attainment in English, maths and science and made better progress in English and maths (taking account of students' individual and family background influences) than those who attended a school judged as 'inadequate'. For science, only those who attended a secondary school judged as 'good' rather than 'inadequate' made significantly more progress.

12) Students' views of their secondary school's 'emphasis on learning' predicted significantly higher attainment and greater progress in all three core subjects.

13) Students' views of a number of secondary school processes predicted attainment and progress. Students who rated their secondary school more favourably in terms of 'behavioural climate' and the 'emphasis on learning' had significantly better attainment in all three subjects, taking account of other influences.

14) Time spent on homework, as reported by students, was a relatively strong predictor of better attainment and progress in all three core areas. Spending any amount of time was beneficial, but the strongest effects were for spending 2-3 hours per day after school.

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[1] A 'value added' measure. For instance, 'more effective' pre-schools were defined as those whose children made significantly greater cognitive/developmental gains controlling for their prior attainment/development and background characteristics from age 3 to 5 yrs. Centres where children made less developmental gains than predicted were defined as 'less effective'.

[2] The Department for Education formerly known as the Department for Children, Schools and Families.

[3] Measured by contextualised 'value-added' estimates of effectiveness based on pupils' progress between KS1 and KS2 from National Curriculum assessments (Melhuish et al., 2006).

15) There were strong and positive links between students' 'academic self-concept' (whether they felt they were good at a subject) for English and maths and their attainment in these subjects. There was also better attainment where students reported they 'enjoyed school', especially for maths. The relationships between these measures tend to be reciprocal e.g., academic attainment predicts 'students' self-concepts' and vice versa. Thus, we can see these outcomes as interdependent.

Background and Aims

Previous phases of the EPPSE project have reported on the influence of a range of individual child, family, neighbourhood, home/out of school learning, pre- and primary school influences on children's attainment, progress and development during pre-school and primary school up to age 11. For full details of earlier phases of the full study see Sylva et al. (2010) and http://eppe.ioe.ac.uk.

The current analyses examined students' attainment in the three core curriculum areas of English, maths and science. The attainment measures were based on Teacher Assessment (TA) judgments made at the end of KS3. The research also investigated how different features of students' secondary school experiences and environment influenced their academic outcomes.

The aims of this stage of the ongoing EPPSE study were to:

- investigate the relationships between students' academic attainments in KS3 (Year 9, age 14) measured by National Assessments in English, maths and science and their individual, family, Home Learning Environment (HLE), and background characteristics;
- explore the influence of pre-school, primary and secondary school experiences, particularly in terms of quality and academic effectiveness, on students' academic attainment and progress;
- examine differences in educational effects between more and less disadvantaged groups of students;
- explore interactions between pre-school, primary and secondary school on students' academic attainment at age 14;
- explore the relationships between students' dispositions (measures of 'academic self-concept', 'enjoyment of school', feelings of 'popularity' and 'anxiety') and their academic outcomes;
- explore the effects of students' experiences of teaching and school processes on academic attainment.

Methodology

The EPPSE research design has been based on an educational effectiveness and mixed methods approach (Sammons et al., 2005; Siraj-Blatchford et al., 2006). This type of design allows for the study of individual, family and home influences, as well as the effect of pre-, primary and secondary school measures on academic and developmental outcomes. This Research Brief focuses on statistical trends and quantitative analyses of factors that predict students' attainment and progress in KS3 based on results using multilevel statistical models.

Throughout its research, EPPSE 3-14 has gathered a wide range of data on children's development, individual, family, home learning environment (HLE), pre- and primary school characteristics. Additional measures of secondary school academic effectiveness derived from KS2-KS4 contextual value added (CVA) indicators produced by the DfE have been added to the EPPSE data set. In addition, various Ofsted inspection judgements were used to provide external indicators of the quality of secondary schools. These were used to complement the measures of quality and effectiveness for pre-school settings and the measures of primary school academic effectiveness collected in previous phases of the research. It has therefore, been possible to explore the influences of various measures of pre-, primary and secondary school on students' outcomes in Year 9. This Research Brief focuses on academic outcomes, but other

data on social-behavioural outcomes and student dispositions (from student self-report) were also collected (see Sammons et al., 2011a; 2011b; 20011c).

National curriculum levels awarded for Teacher Assessment (TA) in English, maths and science have been used to provide measures of academic outcomes in Year 9. Standardised test scores of National Assessments in English and maths in Year 6 have been used as measures of prior attainment when assessing progress over KS3. In order to maximise our sample size and limit any possible bias linked to missing data, multiple imputation was conducted. Comparisons of the results from both imputed and non-imputed data sets indicated that the results are robust, and broadly consistent. The sample included 3002 students with at least three academic assessments from age 3 to age 14. For further details of the methodology see Sammons et al. (2011a).

Findings[4]

Individual student, family and home influences

The analyses started by examining the overall differences in attainment for particular student groups, without controlling for the influence of any other background characteristics. Previously the project has demonstrated that a range of measures related to child and family characteristics and the HLE are important predictors of children's academic attainments and progress up to the end of primary school (Sammons et al., 2008a). The influence of such characteristics can be detected from a young age and they continue to affect later educational attainment. Current results show many similarities with the patterns identified in earlier findings.

Overall attainment

EPPSE students had higher average attainment in maths than in either science or English (a difference of 0.51 of a national curriculum level comparing maths and English, and 0.36 of a level comparing maths and science) at the end of KS3. This pattern of higher results in maths is in line with the most recent TIMMS (2007)[5] survey.

Gender

In Year 9, girls had higher attainment than boys in English, by around 0.4 of a national curriculum level (approximately half a standard deviation). There were no significant gender differences in maths or science results.

Family and the early years Home Learning Environment (HLE)

There were marked differences in attainment related to parents' qualification levels. Students with highly qualified parents (degree level) had much higher attainment on average than those students whose parents had no qualifications (the difference was 1.4 for English, 1.7 for maths and 1.5 for science in terms of TA levels).

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[4] The strength of an effect is expressed in Effect Sizes (ES). This is a statistical concept that shows the strength of the relationship between outcomes while controlling for other factors. An effect size of 0.1 is relatively weak, one of 0.5 moderate in size, one of 0.7 fairly strong. Differences have also been shown in terms of National Curriculum levels. In most cases only statistically significant effects have been reported.

[5] Sturman et al. (2008) revealed England as the highest performing country in Europe in maths with the most improved results since 1995. It should be noted that EPPSE students had experienced the National Numeracy Strategy (DfEE, 1998) during their time in primary school and this is likely to have benefited their attainment as research has shown (Tymms & Merrell, 2007) that this significantly raised overall attainment standards in maths.

There were similarly large differences related to family socio-economic status (SES) between those from professional non-manual and those from semi/unskilled, manual/unemployed groups. Moreover, students eligible for free school meals (FSM[6]) had lower average attainment than students who were not eligible. The differences were around 0.7 (English and science) and 0.8 (maths) of a national curriculum level.

The quality of the early years HLE was also strongly associated with differences in attainment at KS3. Those who had experienced a high compared to low early years HLE were generally one (1.0) national curriculum level higher for English and science, and 1.3 higher for maths.

The net effects of student, family and HLE characteristics on attainment in Year 9

The average group differences described above do not take into account the relative influence of other characteristics. Multilevel modelling provides results of the 'net' contribution of individual characteristics, whilst controlling for other predictors and so enables the identification of the 'strongest' net predictors. For instance, the higher attainment of students whose mothers have degrees is compared to those with no qualifications, net of the influence of other family and student characteristics (SES, income, HLE or gender). Mother's qualification level was the strongest predictor of better attainment for English, maths and science. The next strongest predictor was gender but for English only, where the effect (strongly positive for girls) was larger in KS3 than was the case when these students were in primary school.

There were also a number of additional strong/moderately strong predictors related to student background listed in decreasing order of effect size (ES):

- ***English:*** family income, birth weight, father's highest qualification level, early years HLE;
- ***Maths:*** birth weight, early years HLE, father's qualification level, ethnicity, family SES;
- ***Science:*** father's qualification level, early years HLE, family SES, ethnicity.

It should be noted that ethnicity was not a significant predictor of TA levels in English, but it was for maths and science; students of Indian heritage obtained significantly better results in maths and science than White British students, controlling for the influence of other factors[7]. FSM and family SES also had moderate effects on attainment in English, maths and science. These effects were similar in size to those related to the early years HLE for English. The early years HLE had relatively stronger continued effects for maths and science than FSM.

Poverty and neighbourhood influences

There is evidence that the 'social composition' of the school, as measured by the percentage of students entitled to FSM may influence individual student's outcomes over and above their own FSM status. EPPSE students who attended a secondary school with an intake containing higher proportions of students receiving FSM showed poorer attainment in English, maths and science, although the effects were relatively weak.

Levels of neighbourhood disadvantage (measured by the IMD[8] - Noble et al., 2004; and IDACI[9] - Noble et al., 2007) were also significant predictors of lower student attainment in English and science in Year 9. This was not the case during the primary school years, possibly because neighbourhood influences increase as adolescents interact more with their peer group outside the home. Students who lived in disadvantaged

[6] FSM = Free school meals which is an indicator of low income/poverty.

[7] The number of EPPSE students in minority ethnic group categories is typically small. Thus, any differences for specific groups must be interpreted with caution.

[8] Index of Multiple Deprivation.

[9] Income Deprivation Affecting Children Index.

neighbourhoods had poorer attainment, over and above their own and their family characteristics, although these neighbourhood effects are relatively small compared to those of the family.

Pre-school influences

Attendance

Just having attended a pre-school was found to be a statistically significant predictor of better attainment in both maths and science (but not English) at the end of KS3, compared with the 'home' group who had little or no experience of pre-school. Although relatively weak (ES=0.26 for maths; ES=0.22 for science), these effects were still stronger than those found for 'age' (being autumn-born) and were similar to the effects for family income in both maths and science.

Quality and effectiveness

The quality[10] of the pre-school attended also continued to predict better outcomes in maths and science in KS3. The effects for medium and high quality were slightly larger than for low quality (compared to the 'home' group). For example, the ES for high quality was 0.28 for attainment in maths. In science, only those who had attended a medium or high quality pre-school continued to show significantly better attainment in Year 9 than the 'home' group at age 14.

A pre-school's effectiveness in promoting young children's pre-reading skills continued to predict better outcomes for EPPSE students in English at age 14, with the highly effective category being statistically significant (ES=0.20) in predicting better attainment when compared to the 'home' group. For maths, in Year 9, all groups (ES=0.36 for high; ES=0.22 for medium; ES=0.30 for low effectiveness) had significantly better results than the 'home' group after controlling for other factors. For science, having attended a high (ES=0.33) or medium effective (ES=0.19) pre-school (in promoting early number concepts) predicted significantly better outcomes than not attending a pre-school. Those who had attended a low effective pre-school showed no better outcomes in science by the end of KS3 than the 'home' group.

Primary school influences

Previous EPPSE research has shown that the academic effectiveness of a child's primary school was a statistically significant predictor of better attainment and progress across KS2 for English and effects were even stronger for maths. Other educational effectiveness research suggests that primary schools can continue to influence students' longer term academic outcomes at secondary school (Goldstein & Sammons, 1997; Leckie, 2009). In KS3, the academic effectiveness of the primary school the EPPSE students had attended still predicted better outcomes for students in both maths and science attainment three years after transferring to secondary school.

Controlling for student, family and HLE background characteristics, by the end of KS3, the extra benefit of having attended a medium effective primary school was relatively small compared with the low effective group (ES=0.13 for maths; ES=0.10 for science). The net effects of having attended a high academic effective primary school on later attainment compared with the effects of attending a low effective one were rather stronger (ES=0.31 for maths; ES=0.29 for science). These effects are similar in size to those of FSM status. The effect, measured in terms of TA levels, represents a third of a level for maths and a quarter of a level for science.

[10] Measured by the Early Childhood Environment Rating Scales (ECERS-R and ECERS-E - see Sylva et al., 2010).

Combined effects of pre-school and primary school

Pre-school effectiveness (in promoting early number concepts) was tested jointly with the primary school academic effectiveness measure and the results indicated that having attended a high effective pre-school offered some protection, even if a student went on to a less effective primary school, for later maths and science outcomes. Likewise, having attended a more academically effective primary school mitigated the effects of experiencing no or only a low effective pre-school. The longer term protective effects of pre-school effectiveness were shown most clearly for students who then attended a low academically effective primary school when we studied their later attainment in Year 9 of secondary school.

Further analyses of the combined effects showed that the continued benefits of pre-school were most evident for EPPSE students who went on to attend medium or low effective secondary schools, suggesting a longer term protective influence of pre-school against attending an ineffective secondary school.

Transition from primary to secondary school

A sub sample of EPPSE students (N=550) and parents were asked about their experience of the transition from primary to secondary school. Five factors were identified by students and parents as important in the transition (Evangelou et al., 2008):

- Developing friendship, self-esteem and confidence
- Settling into school life
- Showing interest in school and school work
- Getting used to new routines
- Experiencing curriculum continuity.

Students who quickly became accustomed to school routines and who experienced continuity in the curriculum from primary to secondary school made better progress in maths and science across KS3 and also had higher attainment in all three core subjects at Year 9. Although statistically significant, these effects were relatively small (ES ranged between 0.21 and 0.32). Other transition factors were less predictive of school academic success, suggesting that familiarity with the school building and routines, along with familiar curriculum materials in lessons may be more important during transition than self-esteem, interest in school work or settling into a new social situation. The results suggest that efforts in these areas to facilitate a better transfer may benefit students' academic outcomes.

Secondary school influences

Academic effectiveness of secondary schools

The overall academic effectiveness of secondary schools[11] did not predict EPPSE students' attainment in Year 9, after controlling for individual student, family and HLE measures. In interpreting this result it should be noted that, in contrast to the primary school academic effectiveness measure, these DfE Contextual Value Added (CVA) measures were not subject specific (separate for English, maths and science) in KS3 and this may have affected the results. However, after controlling for the same characteristics, the quality of the secondary school EPPSE students attended, measured by Ofsted inspection ratings, was found to be significant. In particular, the inspection judgment of the 'quality of pupils' learning'[12] was found to predict EPPSE students' attainment in both English and science, with the difference being only statistically

[11] Using CVA (Contextual Value Added) measures derived from DfE's National Pupil Database (NPD) that measures student progress over KS2-4.

[12] As measured by inspectors from the Office for Standards in Education (Ofsted) during formal school inspections.

significant (but moderately strong) for the 'outstanding' schools category compared with the 'inadequate' category (ES=0.42 English; ES=0.51 science).

For maths attainment, schools judged by Ofsted as 'good' (on the 'quality of learning') showed more modest and significant positive effects (ES=0.26) and those judged as 'outstanding' showed stronger effects (ES=0.56) compared with the 'inadequate' category.

These results show that secondary school quality remains important in shaping students' academic attainment, over and above the impact of background characteristics. The effects are equivalent to between 0.34 and 0.64 of a TA level for those who attended an 'outstanding' rather than an 'inadequate' school (in terms of the Ofsted judgement 'quality of learning'). A similarly strong pattern was identified for Ofsted judgments of 'learners' attendance'. It should be noted that these two Ofsted measures ('quality of learning' and 'learners' attendance') are also correlated and hence were tested separately.

Progress across Key Stage 3

Students' academic progress across KS3 was studied by controlling for their prior attainment measured at the end of primary school (Year 6) as well as taking account of individual student, family and HLE characteristics. Overall, there was evidence that students made more progress in English, maths and science over KS3 if they:

- were older for their year group (autumn-born) (ES=0.24 English; ES=0.32 maths; ES=0.20 science);
- were girls (ES=0.32 English; ES=0.16 maths; ES=0.17 science);
- had highly qualified fathers (ES=0.28 English, ES=0.28 maths and ES=0.43 science).

Students whose mothers were highly qualified (degree/higher degree) made better progress in only English (ES=0.34) and science (ES=0.33). Additionally, students whose families had high incomes also made better progress in English (ES=0.39).

A higher percentage of students in a school eligible for FSM predicted poorer progress for individual students in the EPPSE sample in both English (ES=0.18) and science (ES=0.21). Of the neighbourhood measures tested, only the percentage of White British and the level of reported crime were significant predictors of poorer student progress for English. For progress in science however, reported crime, perceived neighbourhood safety, the IMD and IDACI were all found to be statistically significant predictors. These findings indicate that the disadvantage of the school's intake and neighbourhood had small negative effects predicting both poorer progress as well as attainment. This shows that schools in some areas face more challenging circumstances in improving student learning.

Higher Ofsted measures of the 'quality of pupils' learning' and 'attendance of learners' were also significant predictors of better progress in all three core subjects. EPPSE students who attended an 'outstanding' secondary school in terms of the 'quality of learning' made significantly more progress in the three core subjects than those in schools judged to be 'inadequate' (ES ranged between 0.29 and 0.36). Additionally, students from secondary schools characterised as 'outstanding', 'good' or even 'satisfactory', in terms of 'pupils' attendance' made significantly more progress in English (ES=0.48 for outstanding) and maths (ES=0.35 for outstanding).

Students' experiences and reports of secondary school

Students' secondary school experiences were explored using self-report questionnaires administered in Year 9. Measures were tested to see if they predicted academic attainment and progress after controlling for individual, family and HLE characteristics as well as the percentage of students on FSM in the school.

Students who reported that their school placed a higher 'emphasis on learning' had significantly higher attainment. The difference was half a TA level in English and science and three quarters of a TA level for maths (ES ranged between 0.20 and 0.22).

EPPSE students' attainment was also found to be higher where they perceived a more 'positive behavioural climate' in their secondary school. This difference was particularly noticeable for maths (ES=0.46). The perceived 'quality of the school environment'[13] was also a predictor of better attainment, although the effects were smaller and only significant for maths and science (ES=0.13 for both). Similar, small but positive effects were identified for the factor related to students' perceptions of how much they felt teachers 'valued and respected' them. Finally, the factor 'learning resources' (related to whether students felt the school was well equipped with computers and technology) also predicted better attainment in maths (ES=0.13) and science (ES=0.15) in KS3. Although the effect sizes were relatively small, this is the equivalent of around half a TA level for both these subjects.

After testing these factors separately as predictors of attainment, they were also tested together to investigate which ones are the most important in predicting academic outcomes in Year 9 when still controlling for individual student, family and HLE characteristics. The factors 'emphasis on learning' and 'behavioural climate' significantly predicted Year 9 academic attainment in all three core subjects when tested together.

The analyses of students' progress during KS3 revealed that 'behavioural climate', 'valuing pupils' and 'teacher support' were significant predictors of progress in English, maths and science. The quality of the 'school environment' and 'learning resources' were only significant for maths and science. 'Headteacher qualities' was a significant predictor for progress in maths (ES=0.15). Finally, 'teacher behaviour management' was a significant predictor of progress in science (ES=0.14).

After controlling for individual, family and HLE influences, the daily time spent on homework, as reported by students, was found to be an important and strong predictor of better attainment and progress (ES for 2-3 hours of homework/day ranged between 0.69 and 0.85 for the three core subjects). Spending more time on homework is likely to increase study skills and opportunities to learn, it may also be influenced by the student's own self-regulation. It is also likely to reflect secondary school policies and teacher expectations and the academic emphasis in the school as well as encouragement from parents to take school work seriously.

Students' views of themselves

Earlier EPPSE research (Sammons et al., 2008b), has demonstrated positive relationships between 'academic self-concept' and attainment. Higher 'academic self-concept' predicted better attainment and vice-versa. Patterns of attainment and self-concept in younger children can shape their future identities as learners. The results for EPPSE students in secondary school show fairly strong links between 'maths academic self-concept' as a predictor of maths attainment in Year 9 (ES=1.2; nearly 1 TA level). By contrast, 'English academic self-concept' was a weaker predictor of Year 9 English attainment (ES=0.74; equivalent to approximately a half of a TA level). Students' self-reported 'enjoyment of school', also predicted attainment, with stronger effects for maths (ES=0.38) than science (ES=0.31) or English (ES=0.29).

Conclusions and Implications

The analyses of students' attainment in English, maths and science at the end of Year 9, and progress across KS3, have provided a wide range of evidence concerning the factors that predict academic success in Year 9. However, no one predictor explains it all; it is the combination of school factors, alongside individual, family, home and neighbourhood influences, especially the mothers' qualification level, the early years HLE and family SES, that shape students' academic outcomes up to age 14.

[13] This factor includes attractive and well decorated buildings, cleanliness of toilets etc.

The socio-economic characteristics of the student's family continued to predict academic attainment at the end of KS3 in the three core curriculum areas. This research also provides evidence that the school and neighbourhood can also affect outcomes. The early years HLE remains an important predictor of better attainment at age 14, and this has relevance for the development of policy regarding families and parenting. The research has implications for the debate on the drivers of social inequality and has messages for both policy and practice that may help to narrow the gap in educational outcomes and improve children's and young people's learning over their life course.

The research reveals that specific characteristics of educational institutions predicted attainment in core subjects up to the end of KS3. The child's early experiences within a pre-school centre continue to predict attainment through primary and into secondary school. Pre-school attendance and also pre-school quality and effectiveness continued to predict later attainment in maths and science. This is relevant to the development of policies intended to increase the quality and effectiveness of pre-school and is especially important given the increased numbers of children who now take up their funded place.

The findings also provide evidence that the academic effectiveness of the primary school not only influenced EPPSE students' attainment and progress during KS2, but also continued to predict better outcomes in maths and science later on in KS3. This shows the relevance of educational effectiveness (CVA) indicators (of primary school performance in specific subjects) for both policy makers and practitioners in providing useful information to help evaluate institutions. Other research has also demonstrated that more effective schools tend to make greater use of performance data to help improve their practice (Day et al., 2009).

There is also evidence of secondary school effects on EPPSE students' progress across KS3. The Ofsted inspection indicator of school 'quality' predicted both attainment and progress over and above individual, family, HLE and neighbourhood characteristics. Attending a school judged to be 'outstanding' by Ofsted provided a moderately large boost to student attainment outcomes in all three core areas of the curriculum.

Moreover, the results point to the potential importance of the students' own perceptions and their views. Students' reports on secondary school processes predicted differences in attainment and progress. Focussing on improving areas of the secondary school experience such as 'emphasis on learning' and the school's 'behavioural climate' for all three core subjects plus providing good 'learning resources' (for maths and science) is likely to promote better academic results and also improve social-behavioural development and student dispositions[14] (see Sammons et al., 2011a; 2011b; 2011c). This suggests that consulting students and obtaining their views on such topics is likely to be extremely helpful for school self-evaluation.

These results indicate that optimising each phase of education, pre-, primary and secondary school has the potential to improve the attainment of the whole school population in the longer term. These findings build on and extend findings reported for the EPPSE students at younger ages and show that better pre-schools and primary schools continue to have a protective effect in terms of boosting later attainment for all students.

Parenting is important too, and improving the early years home learning environment (HLE) is likely to benefit the educational attainment of children in both the short term and the whole population in the longer term since such effects are shown to last into adolescence. All of these points are particularly relevant for young people growing up in disadvantaged families and neighbourhood contexts.

It has been estimated that by 2050, the working age population within Europe will decrease by approximately twelve per cent, whereas the elderly will increase by fifty per cent. In these circumstances, maximising the productivity of the working population can be viewed as necessary for economic

[14] 'Dispositions' here refer to factors such as 'academic self-concept', 'enjoyment of school' and 'citizenship values' etc.

sustainability. One strategy to increase productivity is to enhance educational attainment across the population. This is especially important when the skills necessary for modern economies are rising and changing in nature and when there is still great inequality of opportunities and outcomes. The results of this study provide some pointers to strategies related to policies on supporting parents, promoting higher quality in early years provision and improving educational experiences. Developing policies informed by such evidence may help to address these issues in the medium to longer term.

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Table 1: Summary of the effects of students' background characteristics and pre-, primary and secondary school influences on academic attainment in Year 9

(Only the largest effect sizes for the original data are reported; comparison group in brackets)

	English	Mathematics	Science
Pupil characteristics			
Age (continuous)	0.19	0.15	0.16
Gender (boys)	0.46	ns	ns
Birth weight (normal)	-0.37	-0.40	-0.35
Ethnicity[†] (White UK heritage)	ns	0.37	0.30
Early developmental problems (none)	-0.21	-0.16	-0.15
Early behavioural problems (none)	-0.18	-0.18	ns
Number of siblings (none)	-0.31	-0.19	ns
Family characteristics			
Mother's age (continuous)	0.16	ns	0.09
Mother's qualification level (none)	0.61	0.50	0.61
Father's qualification level (none)	0.36	0.37	0.48
Free school meals (FSM) (non-FSM)	-0.30	-0.31	-0.31
Family SES (professional non-manual)	-0.29	-0.36	-0.31
Family earned income (none)	0.40	0.21	0.29
School level FSM (continuous)	-0.19	-0.20	-0.22
Home Learning Environment (HLE)			
Early years HLE (low)	0.29	0.38	0.41
Key Stage 1 HLE (low)	0.24	ns	0.15
Key Stage 2 HLE (low)	0.19	0.17	0.17
Pre-school*			
Attending (not attending)	ns	0.26	0.22
Pre-school quality*			
ECERS-E (no pre-school)	ns	0.28	0.23
ECERS-R (no pre-school)	ns	ns	ns
Pre-school effectiveness*			
Early number concepts (no pre-school)	ns	0.36	0.33
Pre-reading (no pre-school)	0.20	ns	ns
Primary School Effectiveness**			
English	ns		
Mathematics		0.31	0.29
Science			0.24
Secondary School Quality			
Quality of pupils' learning (inadequate)	0.42	0.56	0.51
Learners' attendance (inadequate)	0.70	0.71	0.56

[†] The number of EPPSE students in minority ethnic group categories is typically small. Thus, any differences for specific groups must be interpreted with caution.

*The reference group for all pre-school quality and effectiveness comparisons is the 'home' group, who had very little or no pre-school experience. The effect sizes represent differences between the 'home' group and the 'high quality/effectiveness' group unless stated otherwise.

** The reference group for primary school is 'low effectiveness'. The effect sizes represent differences between the 'low effectiveness' group and the 'high effectiveness' group.

Additional Information

This research brief can be accessed at http://publications.education.gov.uk.
The full report of the same name can be accessed from the EPPSE Website:
http://eppe.ioe.ac.uk

Research Reports investigating the EPPSE students' social- behavioural outcomes and dispositions in KS3 are also available (see Sammons et al., 2011b; 2011c).

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This research report was commissioned before the new UK Government took office on 11 May 2010. As a result the content may not reflect current Government policy and may make reference to the Department for Children, Schools and Families (DCSF) which has now been replaced by the Department for Education (DFE).

The views expressed in this report are the authors' and do not necessarily reflect those of the Department for Education.